01-22-02

JC07 Rec'd PCT/PTO 17 JAN 2002

PCT

#3

ATTORNEY DOCKET NO: 70372

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : KEHL
Serial No : PCT/DE00/01949
Filed :
For : SELF-CONTAINED HONEYCOMB...
Art Unit :
Examiner :
Dated : January 17, 2002

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231
Box DAC

PETITION TO REVIVE UNINTENTIONALLY ABANDONED APPLICATION (37 CFR 1.137(b))

Applicant/Petitioner hereby petitioners the Commissioner to revive PCT International Application serial number PCT/DE00/01949 filed June 20, 2000.

The 30 month deadline for entering the national phase expired December 23, 2001.

Applicant/Petitioner hereby wishes to advise that the entire delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to 37 CFR 1.37(b) was unintentional. Applicant/Petitioner further wishes to advise that a response to the entering of the national phase in the form of PCT national phase application together with the appropriate petition fee is attached hereto.

01/31/2002 NNGUYEN 00000172 10031964
02 FC:241 640.00 OP

Favorable action is respectfully requested.

Respectfully submitted
for Applicant/Petitioner,

By: _____
John James McGlew
Registration No. 31,903
For: McGLEW AND TUTTLE, P.C.

JJM:tf
70372.5

Enclosures: - New U.S. Patent Application
- Check in the amount of $640.00 under Section 1.17(m)

DATED: SCARBOROUGH STATION
SCARBOROUGH, NEW YORK 10510-0827
(914) 941-5600
January 17, 2002

SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-0410.

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS EXPRESS MAIL IN AN ENVELOPE ADDRESSED TO: COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231, NO. EL 346 229 645 US US

McGLEW AND TUTTLE, P.C., SCARBOROUGH STATION,
SCARBOROUGH, NEW YORK 10510-0827

BY: _____ DATE: January 17, 2002

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		Attorney's Docket Number 70372
		US Application No (if known sec 17 C F R 1 5) 10/031964
INTERNATIONAL APPLICATION NO. PCT/DE00/01949	INTERNATIONAL FILING DATE 20/June/2000	PRIORITY DATE CLAIMED 23/June/1999
TITLE OF INVENTION SELF-CONTAINED HONEYCOMB STRUCTURE FROM FLEXIBLE FILM STRIPS AND METHOD FOR ITS PRODUCTION		
APPLICANT(S) FOR DO/EO/US KEHL		

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.

2. [ ] This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C 371

3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).

4. [ ] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. [X] A copy of the International Application as filed (35 U.S.C. 371(C)(2))
   a. [ ] is transmitted herewith (required only If not transmitted by the International Bureau).
   b. [X] has been transmitted by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US)

6. [X] A translation of the International Application into English (35 U S.C 371(c)(2)).

7. [ ] Amendments to the claims of the International Application under PCT Article 19 (35 U S C. 371(c)(3))
   a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau)
   b. [ ] have been transmitted by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired
   d. [ ] have not been made and will not be made.

8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. [X] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. [ ] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other documents (s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98

12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3 28 and 3 31 is included.

13. [X] A FIRST preliminary amendment.
    [ ] A SECOND or SUBSEQUENT preliminary amendment.

14. [X] A substitute specification.

15. [ ] A change of power of attorney and/or address letter.

16. [X] Other items or information:
    Formal Drawings (2 sheets)
    Copy of Express Mail Receipt No. EL 346 229 645 US
    Marked Up Copy of the Translation

531 Rec'd PCT/PTO 17 JAN 2002

U.S. Appln No (if known, see 37 CFR 1.5) 10/031964	International Application No PCT/DE00/01949	Attorney's Docket Number 70372

JAN 17 2002 PATENT & TRADEMARK OFFICE

17. [X] The following fees are submitted: **BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):**	CALCULATIONS PTO USE ONLY
Search Report has been prepared by the EPO or JPO $890.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482) $710.00	
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) $740.00	
Neither international preliminary examination fee (37 CFR 1.482 nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO $1,040.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) $100.00	

ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 890.00	
Surcharge of $130.00 for furnishing the oath or declaration later than [ ]20 [ ]30 months from the earliest claimed priority date (37 CFR 1.492(e))	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	14 - 20 =	0	X $ 18.00	$ 0.00	
Independent claims	2 - 3 =	0	X $ 84.00	$ 0.00	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $280.00	$ 0.00	
TOTAL OF ABOVE CALCULATIONS =				$ 0.00	

Reduction of 1/2 for filing small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1,28)	$ 445.00	
SUBTOTAL =	$ 445.00	
Processing fee of $130.00 for furnishing the English translation late than [ ]20 [ ]30 months from the earliest claimed priority date (37 CFR 1.492(f)). +	$ 0.00	
TOTAL NATIONAL FEE =	$ 445 00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property +	$ 0.00	
TOTAL FEES ENCLOSED =	$ 445.00	
	Amount to be: refunded	$
	charged	$

a. [X] A check in the amount of $ 445.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. 13-0410 in the amount of $_____ to cover the above fees
A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 13.0410. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:

McGLEW AND TUTTLE, P.C.
Scarborough Station
Scarborough, NY 10510-0827

Signature

John James McGlew
Name

31,903
Registration Number

ATTORNEY DOCKET NO: 70372

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : KEHL
PCT No : PCT/DE00/01949
Filed : January 17, 2002
For : SELF-CONTAINED...
Dated : January 17, 2002

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Prior to initial examination, please amend the above-identified application as follows

IN THE SPECIFICATION:

Please replace the specification originally filed, with the enclosed substitute specification. A marked up copy of the original specification is attached. Applicant states that no new matter has been added.

IN THE CLAIMS:

Please amend the claims as follows:

1. (AMENDED) A honeycomb structure comprising:

a plurality of flexible material strips arranged next to one another, said strips being connected to one another, said material strips having a corrugated shape with a U-shaped cross section of essentially straight vertical partial areas and curved horizontal partial areas, said

material strips being connected to one another at said contact points of the straight vertical partial areas.

2. (AMENDED) A honeycomb structure in accordance with claim 1, wherein the material strips are films of plastic, paper, metal or composite materials.

3. (AMENDED) A honeycomb structure in accordance with claim 1, wherein the material strips are welded to one another.

4. (AMENDED) A honeycomb structure in accordance with claim 1, wherein the material strips are bonded to one another.

5. (AMENDED) A device for manufacturing a honeycomb structure with a plurality of flexible material strips arranged next to one another, the strips being connected to one another, the material strips having a corrugated shape with a U-shaped cross section of essentially straight vertical partial areas and curved horizontal partial areas, the material strips being connected to one another at the contact points of the straight vertical partial areas, the device comprising:

welding sections guiding the flexible material strips;

a comb-like finger system, said material strips being welded to one another with the comb-like finger system, the finger system or the welding sections being laterally displaced by

two sections;

a pressing-on device between the finger and the welding section pressing two material strips onto a heated welding wire to produce a thermal connection of the material strips.

6. (AMENDED) A device in accordance with claim 5, wherein fingers of the finger system are equipped with a heating wire for welding together the material strips.

7. (AMENDED) A device in accordance with claim 5, wherein both the welding sections and the fingers are equipped with a heating wire for welding together the material strips.

8. (AMENDED) A device in accordance with claim 5, wherein the welding sections or the fingers may also be equipped with high-frequency or ultrasonic welding units.

9. (AMENDED) A device in accordance with claim 5, wherein the welding sections or the fingers may also be equipped with laser welding units.

10. (AMENDED) A device in accordance with claim 5, wherein the welding sections or the fingers may also be equipped with heated metal straps, metal elements or heating cartridges as welding units.

11. (AMENDED) A device in accordance with claim 5, wherein the welding sections or the fingers may also be equipped with hot air welding units.

12. (AMENDED) A device in accordance with claim 5, wherein the welding sections or the fingers may also be equipped with induction welding units.

13. (AMENDED) A device in accordance with claim 5, wherein the welding sections or the fingers may also be equipped with friction welding units.

14. (AMENDED) A device in accordance with claim 5, wherein the feeding of the honeycomb can be accomplished by means of the slide elements at the welding sections, but also with finger systems which move into the completely welded honeycomb and subsequently perform a feed motion.

REMARKS

Claims 1 through 14 are in this application and are presented for consideration. Claims 1 through 14 have been amended. The amended claims present the same subject matter as the original claims but have been amended to adapt them to the U. S. style.

The specification and claims have been amended in order to place this application in better form. The reference to claims in the specification has been deleted or amended. Appropriate headings have been added. No new matter has been added.

Favorable action on the merits is respectfully requested.

Respectfully submitted
for Applicant,

By:_____
John James McGlew
Registration No. 31,903
McGLEW AND TUTTLE, P.C.

JJM:jj/esd
70372.1

Enclosed: Version of Claims Showing Changes, Substitute Specification and Marked up copy of Translation

DATED: January 17, 2002
SCARBOROUGH STATION
SCARBOROUGH, NEW YORK 10510-0827
(914) 941-5600

SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-0410.

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS EXPRESS MAIL IN AN ENVELOPE ADDRESSED TO: COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231, NO.: EL 346 229 645 US

McGLEW AND TUTTLE, P.C.
SCARBOROUGH STATION, SCARBOROUGH, NY 10510-0827

BY:_____ DATE: January 17, 2002

Version of Claims Showing Changes

~~[1. Honeycomb]~~ 1. (AMENDED) A honeycomb structure comprising:

a plurality of flexible material strips arranged next to one another, said strips being connected to one another, said material strips having a corrugated shape with a U-shaped cross section of essentially straight vertical partial areas and curved horizontal partial areas, said material strips being connected to one another at said contact points of the straight vertical partial areas.

2. (AMENDED) A honeycomb structure in accordance with claim 1, wherein the material strips are films of plastic, paper, metal or composite materials.

3. (AMENDED) A honeycomb structure in accordance with claim 1, wherein the material strips are welded to one another.

4. (AMENDED) A honeycomb structure in accordance with claim 1, wherein the material strips are bonded to one another.

5. (AMENDED) A device for manufacturing a honeycomb structure with a plurality of flexible material strips ~~[which are]~~arranged next to one another, ~~[are]~~the strips being connected to one another~~[and are characterized in that]~~, the material strips ~~[have]~~having a corrugated shape with a U-shaped cross section of ~~[said]~~essentially straight~~[,]~~ vertical partial areas ~~[(3)]~~and ~~[said]~~curved~~[,]~~ horizontal partial areas~~[(2)]~~,~~[and that]~~ the material strips ~~[are]~~being connected to one another at ~~[said]~~the contact points ~~[(4)]~~of the straight~~[,]~~ vertical partial areas~~[.~~

~~2. Honeycomb structure in accordance with claim 1, characterized in that the material strips may consist of films (e.g., plastic), paper, metal or composite materials.~~

~~3. Honeycomb structure in accordance with claim 1, characterized in that the material strips are welded to one another.~~

~~4. Honeycomb structure in accordance with claim 1, characterized in that the material strips are bonded to one another.~~

~~5. Device for manufacturing a honeycomb structure in accordance with one of the claims 1 through 4, characterized in that it has said]~~, the device comprising:

welding sections ~~[(6), by which]~~guiding the~~[said]~~ flexible material strips~~[(9) are guided, wherein the said material strips are welded to one another by means of a said]~~;

a comb-like finger system~~[(10) by]~~, said material strips being welded to one another with the comb-like finger system, the finger system or the welding sections being laterally

displaced by two sections[, and],

a pressing-on [operation]device between the finger and the welding section [takes place, which presses]pressing two material strips onto a [said]heated welding wire [(7), which leads]to produce a thermal connection of the material strips.

6.[D] (AMENDED) A device in accordance with claim 5, [characterized in that the said]wherein fingers [(10)]of the finger system are equipped with a [said] heating wire[(7)] for welding together the material strips.

7.[D] (AMENDED) A device in accordance with claim 5, [characterized in that]wherein both the[said] welding sections [(6)]and the [said]fingers[(10)] are equipped with a [said] heating wire[(7)] for welding together the material strips.

8.[D] (AMENDED) A device in accordance with claim 5, [characterized in that]wherein the[said] welding sections [(6)]or the[said] fingers[(10)] may also be equipped with high-frequency or ultrasonic welding units.

9.[D] (AMENDED) A device in accordance with claim 5, [characterized in that]wherein the[said] welding sections [(6)] or the [said]fingers[(10)] may also be equipped with laser welding units.

10.[D] (AMENDED) A device in accordance with claim 5, [characterized in that]wherein the[said] welding sections [(6)]or the[said] fingers[(10)] may also be equipped with heated metal straps, metal elements or heating cartridges as welding units.

11.[D] (AMENDED) A device in accordance with claim 5, [characterized in that]wherein the[said] welding sections [(6)]or the[said] fingers[(10)] may also be equipped with hot air welding units.

12.[D] (AMENDED) A device in accordance with claim 5, [characterized in that]wherein the[said] welding sections [(6)]or the[said] fingers[(10)] may also be equipped with induction welding units.

13.[D] (AMENDED) A device in accordance with claim 5, [characterized in that]wherein the[said] welding sections [(6)]or the[said] fingers[(10)] may also be equipped with friction welding units.

14.[D] (AMENDED) A device in accordance with claim 5, [characterized in that]wherein the feeding of the honeycomb can be accomplished by means of [said]the slide elements [(8)]at the[said] welding sections[(6)], but also with finger systems which move into the completely welded honeycomb and subsequently perform a feed motion.

Self-supporting Honeycomb Structure from Flexible Film Strips and Process for Manufacturing Same

The present invention pertains to a honeycomb structure from flexible material strips, which are connected to one another, so that a self-supporting honeycomb structure is formed, as well as to a process for manufacturing same.

Corresponding honeycomb structures are used, among other things, as transparent or opaque heat insulation, as filler material for partitions or as the core material in the manufacture of sandwich boards.

If the honeycombs are used as heat insulation, low density is important in order to obtain good insulation values. If the honeycombs shall be used for sandwich boards, high compressive strength combined with high shear strength shear strength is necessary.

Similar honeycomb structures are described in the Auslegeschrift DT 2231959 B2 and in the Offenlegungsschrift DE 197 03 961 A1.

The Auslegeschrift DT 2231959 B2 describes a honeycomb from corrugated, rigid strips, which have an inherent stability, so that they can be stacked up on one another, and form a self-supporting structure, without the strips being welded or bonded to one another. The prerequisite for this is that the arches of the corrugations have such an arrangement that the shortest free distance between two adjacent peaks of the corrugation in each strip is smaller than the greatest free width of the valley of the corrugation (therefore, the corrugated strips cannot be pushed into one another).

Honeycombs of this type cannot be manufactured from flexible material strips, because a flexible strip cannot be bent into a rigid corrugated shape.

Honeycombs of this type are used as the core for sandwich boards made of metal, e.g., in the manufacture of aircraft.

A honeycomb structure made of flexible film strips is described in the Offenlegungsschrift DE 197 03 961 A1, wherein the film strips are welded onto one another in the corrugated form, so that a self-supporting honeycomb is formed. The principal difference from DT 2231959 B2 is that flexible strips are used here and a honeycomb is generated only when the strips are connected to one another by welding or bonding in the transition area from the horizontal and vertical partial areas of the corrugated strips arranged one on top of another. The residual stress (restoring behavior) of the flexible strips ensures that the honeycomb is more rigid and stable than a honeycomb made of pre-corrugated webs. A honeycomb is formed which is similarly bulged as the honeycomb from DT 2231959 B2 and has a nearly isotropic behavior whether it is loaded mechanically in the vertical or horizontal direction. One drawback is that this honeycomb cannot be compressed without distortions developing in the structure. Another drawback of this honeycomb which is linked with the process is the optically nonuniform edge structure. Since individual film strips are welded to one another, the overhanging film strips overlap at the lateral edges in parallel to the direction of production. To obtain a clean edge closure, an edge strip must be cut off, as a result of which drawbacks arise in terms of costs due to clipping.

The basic object of the present invention is to improve a honeycomb of the type mentioned in the introduction such that a self-supporting honeycomb is formed from flexible strips, which has a clean edge structure and can be compressed in a direction in parallel to the direction of

production.

This object is accomplished according to the present invention in a honeycomb according to claim 1 by a self-supporting honeycomb being manufactured from flexible strips, which honeycomb consists, however, contrary to DE 197 03 961 A1, of horizontal, bent partial areas arranged at right angles to one another in parallel to the direction of production and straight vertical partial areas.

In addition, the bonded or weld seam of the honeycomb being described here consists of straight, vertical partial areas rather than of the horizontal and vertical partial areas of the corrugated strips arranged one on top of another (or in other words, at the edges of the parallelepipedic cavities), as in DE 197 03 961.

These features, which are essential for the present invention, are characteristic of a compressible honeycomb, and the advantage is above all that a compressed honeycomb can be transported at a substantially lower cost. Moreover, there are applications, e.g., as heat insulation, which require a small hole diameter, which can be obtained simply by compressing the honeycomb. Minimization of the hole diameter means a maximization of the heat insulation factor (k value) for a honeycomb.

The honeycomb displays different behaviors under mechanical loading in the horizontal and vertical directions. Compression in parallel to the direction of production is possible without the structure of the honeycomb being distorted. A clean edge is formed on both sides of the honeycomb along the direction of production, because the respective outer film is welded endlessly to the honeycomb.

The device with the process steps, with which a self-supporting honeycomb structure according to the present invention with the features of claim 1 can be manufactured, is disclosed in claim 5.

The device has a welding head, which comprises a plurality of welding sections or webs arranged in parallel to and at uniformly spaced locations from one another, all of which are equipped with a welding wire on the front side. Flat slide elements, which can be displaced forward and backward in parallel to the webs, are in contact with the lateral surfaces of the welding webs.There is a small gap between the slide elements, through which the film strips can be guided. In addition, the device has a comb with individual fingers, which can be moved into and withdrawn from the honeycomb structure in front of the welding webs. The welding head and the finger comb are displaceable in parallel to one another.

In addition, the welding head and the finger comb can be pressed against one another.

The necessary U-shaped corrugated structure of the film strips is produced with the device by the lateral displacement of the welding head and the comb, and the film strips are subsequently welded to one another at the vertical partial areas.

Not only plastic films, but all types of flexible material strips can be connected to one another with the device, the only requirement being the weldability of the material.

The honeycomb structure according to the present invention as well as the process steps for manufacturing this honeycomb structure will be explained in greater detail below on the basis of the drawings attached. In the drawings,

Figure 1 shows a top view of a honeycomb structure according to the present invention.

The connection of the individual film webs to the points designated by (4) is possible by bonding or, as was described above, by preparing a weld seam extending at right angles to the film web.

Figures 2-8 show a top view of the device for manufacturing the honeycomb structure according to Figure 1 with the individual process steps.

The device with the individual process steps, by means of which the honeycomb structure according to the present invention can be manufactured from film webs by using welded connections, will be described below as an example.

Figure 2 shows the welding head with the welding webs (6), which are equipped with welding wires (7) on the front side, and with the flat feed elements (8), which are in contact with the welding webs.

The welding head is located in the starting position, and the individual film strips (9) are inserted between the narrow gaps of the feed elements.

Figure 3 shows the first process step. The feed elements (8) move forward until they project from the welding head over a certain distance. The finger comb (10) now moves between the feed elements and thus into the film strip until it stands in front of the welding head over the full welding height.

The feed elements (8) move back again behind the welding plane corresponding to Figure 4.

The welding head and the finger comb (10) are now displaced in parallel horizontally by an amount corresponding to twice the distance between two welding spots. The first welding of the film takes place in this position, the welding head and the welding fingers being pressed onto one another.

According to Figure 5, the fingers (10) again move out of the film strip (9). The feed elements (8) then move forward and the film structure welded together is fed. The welding head again moves back into the starting position by an amount corresponding to twice the space between two welding spots.

The fingers (10) then move again into the film structure corresponding to Figure 6.

Figure 7 shows how the slides (8) move back behind the welding plane.

The welding head and the fingers (10) are now displaced in opposite directions. Pressing on of the welding head with the fingers (10) and the film welding operation will again take place.

The fingers (10) then move again out of the film structure according to Figure 8 and the cycle of steps begins anew with step 1 (Figure 3).

Patent Claims

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1. Honeycomb structure with a plurality of flexible material strips which are arranged next to one another, are connected to one another and are characterized in that the material strips have a corrugated shape with a U-shaped cross section of said essentially straight, vertical partial areas (3) and said curved, horizontal partial areas (2), and that the material strips are connected to one another at said contact points (4) of the straight, vertical partial areas.

2. Honeycomb structure in accordance with claim 1, characterized in that the material strips may consist of films (e.g., plastic), paper, metal or composite materials.

3. Honeycomb structure in accordance with claim 1, characterized in that the material strips are welded to one another.

4. Honeycomb structure in accordance with claim 1, characterized in that the material strips are bonded to one another.

5. Device for manufacturing a honeycomb structure in accordance with one of the claims 1 through 4, characterized in that it has said welding sections (6), by which the said flexible material strips (9) are guided, wherein the said material strips are welded to

one another by means of a said comb-like finger system (10) by the finger system or the welding sections being laterally displaced by two sections, and a pressing-on operation between the finger and the welding section takes place, which presses two material strips onto a said heated welding wire (7), which leads to a thermal connection of the material strips.

6. Device in accordance with claim 5, characterized in that the said fingers (10) are equipped with a said heating wire (7) for welding together the material strips.

7. Device in accordance with claim 5, characterized in that both the said welding sections (6) and the said fingers (10) are equipped with a said heating wire (7) for welding together the material strips.

8. Device in accordance with claim 5, characterized in that the said welding sections (6) or the said fingers (10) may also be equipped with high-frequency or ultrasonic welding units.

9. Device in accordance with claim 5, characterized in that the said welding sections (6) or the said fingers (10) may also be equipped with laser welding units.

10. Device in accordance with claim 5, characterized in that the said welding sections (6) or the said fingers (10) may also be equipped with heated metal straps, metal elements or heating cartridges as welding units.

11. Device in accordance with claim 5, characterized in that the said welding sections (6) or the said fingers (10) may also be equipped with hot air welding units.

12. Device in accordance with claim 5, characterized in that the said welding sections (6) or the said fingers (10) may also be equipped with induction welding units.

13. Device in accordance with claim 5, characterized in that the said welding sections (6) or the said fingers (10) may also be equipped with friction welding units.

14. Device in accordance with claim 5, characterized in that the feeding of the honeycomb can be accomplished by means of said slide elements (8) at the said welding sections (6), but also with finger systems which move into the completely welded honeycomb and subsequently perform a feed motion.

Abstract

A honeycomb structure with a plurality of flexible material strips which are arranged next to one another and are connected to one another is presented, in which the material strips have according to the present invention a corrugated shape with U-shaped cross section of essentially straight, vertical partial areas (3) and curved, horizontal partial areas (2), wherein the material strips are connected to one another at contact points (4) of the straight, vertical partial areas.

In addition, a device for manufacturing a honeycomb according to the present invention is disclosed, which has welding sections (6), by which the flexible material strips (9) are guided, where the said material strips are welded to one another by means of a comb-like finger system (10) by the finger system or the welding sections being laterally displaced by two sections and by a pressing operation taking place between the finger and the welding section, which presses two material strips onto a heated welding wire (7), which leads to the thermal connection of the material strips.

Figure 1

Figure 1 through Figure 8

Figure 1

KEY:

Produktionsrichtung - Direction of production

Docket #70372

SELF-CONTAINED HONEYCOMB STRUCTURE FROM FLEXIBLE FILM STRIPS AND METHOD FOR ITS PRODUCTION

FIELD OF THE INVENTION

The present invention pertains to a honeycomb structure from flexible material strips, which are connected to one another, so that a self-supporting honeycomb structure is formed, as well as to a process for manufacturing same.

BACKGROUND OF THE INVENTION

Corresponding honeycomb structures are used, among other things, as transparent or opaque heat insulation, as filler material for partitions or as the core material in the

manufacture of sandwich boards.

If the honeycombs are used as heat insulation, low density is important in order to obtain good insulation values. If the honeycombs shall be used for sandwich boards, high compressive strength combined with high shear strength is necessary.

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The Auslegeschrift DT 2231959 B2 describes a honeycomb from corrugated, rigid strips, which have an inherent stability, so that they can be stacked up on one another, and form a self-supporting structure, without the strips being welded or bonded to one another. The prerequisite for this is that the arches of the corrugations have such an arrangement that the shortest free distance between two adjacent peaks of the corrugation in each strip is smaller than the greatest free width of the valley of the corrugation (therefore, the corrugated strips cannot be pushed into one another).

Honeycombs of this type cannot be manufactured from flexible material strips, because a flexible strip cannot be bent into a rigid corrugated shape.

Honeycombs of this type are used as the core for sandwich boards made of metal, e.g., in the manufacture of aircraft.

A honeycomb structure made of flexible film strips is described in the Offenlegungsschrift DE 197 03 961 A1, wherein the film strips are welded onto one another in the corrugated form, so that a self-supporting honeycomb is formed. The principal difference from DT 2231959 B2 is that flexible strips are used here and a honeycomb is

generated only when the strips are connected to one another by welding or bonding in the transition area from the horizontal and vertical partial areas of the corrugated strips arranged one on top of another. The residual stress (restoring behavior) of the flexible strips ensures that the honeycomb is more rigid and stable than a honeycomb made of pre-corrugated webs. A honeycomb is formed which is similarly bulged as the honeycomb from DT 2231959 B2 and has a nearly isotropic behavior whether it is loaded mechanically in the vertical or horizontal direction. One drawback is that this honeycomb cannot be compressed without distortions developing in the structure. Another drawback of this honeycomb which is linked with the process is the optically nonuniform edge structure. Since individual film strips are welded to one another, the overhanging film strips overlap at the lateral edges in parallel to the direction of production. To obtain a clean edge closure, an edge strip must be cut off, as a result of which drawbacks arise in terms of costs due to clipping.

SUMMARY AND OBJECTS OF THE INVENTION

The basic object of the present invention is to improve a honeycomb of the type mentioned in the introduction such that a self-supporting honeycomb is formed from flexible strips, which has a clean edge structure and can be compressed in a direction in parallel to the direction of production.

According to the present invention a self-supporting honeycomb is provided manufactured from flexible strips, which honeycomb consists, however, contrary to DE 197 03 961 A1, of horizontal, bent partial areas arranged at right angles to one another in parallel

to the direction of production and straight vertical partial areas.

In addition, the bonded or weld seam of the honeycomb being described here is located at straight vertical partial areas rather than of the horizontal and vertical partial areas of the corrugated strips arranged one on top of another (or in other words, at the edges of the parallelepipedic cavities), as in DE 197 03 961.

These features, which are essential for the present invention, are characteristic of a compressible honeycomb, and the advantage is above all that a compressed honeycomb can be transported at a substantially lower cost. Moreover, there are applications, e.g., as heat insulation, which require a small hole diameter, which can be obtained simply by compressing the honeycomb. Minimization of the hole diameter means a maximization of the heat insulation factor (k value) for a honeycomb.

The honeycomb displays different behaviors under mechanical loading in the horizontal and vertical directions. Compression in parallel to the direction of production is possible without the structure of the honeycomb being distorted. A clean edge is formed on both sides of the honeycomb along the direction of production, because the respective outer film is welded endlessly to the honeycomb.

According to another aspect of the invention, a device is provided with which a self-supporting honeycomb structure can be manufactured.

The device has a welding head, which comprises a plurality of welding sections or webs arranged in parallel to and at uniformly spaced locations from one another, all of which are equipped with a welding wire on the front side. Flat slide elements, which can be displaced

forward and backward in parallel to the webs, are in contact with the lateral surfaces of the welding webs. There is a small gap between the slide elements, through which the film strips can be guided. In addition, the device has a comb with individual fingers, which can be moved into and withdrawn from the honeycomb structure in front of the welding webs. The welding head and the finger comb are displaceable in parallel to one another.

In addition, the welding head and the finger comb can be pressed against one another.

The necessary U-shaped corrugated structure of the film strips is produced with the device by the lateral displacement of the welding head and the comb, and the film strips are subsequently welded to one another at the vertical partial areas.

Not only plastic films, but all types of flexible material strips can be connected to one another with the device, the only requirement being the weldability of the material.

The honeycomb structure according to the present invention as well as the process steps for manufacturing this honeycomb structure will be explained in greater detail below on the basis of the drawings attached. The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention is illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Figure 1 is a top view of a honeycomb structure according to the present invention;

Figure 2 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing an individual process step;

Figure 3 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step;

Figure 4 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step;

Figure 5 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step;

Figure 6 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step;

Figure 7 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step; and

Figure 8 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing still another process step.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 shows honeycomb structure according to the present invention. The connection of the individual film webs, to the points designated by 4, is possible by bonding or, as was described above, by preparing a weld seam extending at right angles to the film web.

Figures 2 to 8 show the device for manufacturing the honeycomb structure according

to Figure 1. An example according to the present invention will be described below. The example includes individual process step for manufacturing a honeycomb structure with film webs using welded connections.

Figure 2 shows the welding head with the welding webs 6, which are equipped with welding wires 7 on the front side, and with the flat feed elements 8, which are in contact with the welding webs.

The welding head is located in the starting position, and the individual film strips 9 are inserted between the narrow gaps of the feed elements.

Figure 3 shows the first processing step. The feed elements 8 move forward until they project from the welding head over a certain distance. The finger comb 10 now moves between the feed elements and thus into the film strip until it stands in front of the welding head over the full welding height.

The feed elements 8 move back again behind the welding plane corresponding to Figure 4. The welding head and the finger comb 10 are now displaced in parallel horizontally by an amount corresponding to twice the distance between two welding spots. The first welding of the film takes place in this position, the welding head and the welding fingers being pressed onto one another.

According to Figure 5, the fingers 10 again move out of the film strip 9. The feed elements 8 then move forward and the film structure welded together is fed. The welding head again moves back into the starting position by an amount corresponding to twice the space between two welding spots.

The fingers 10 then move again into the film structure corresponding to Figure 6. Figure 7 shows how the slides 8 move back behind the welding plane.

The welding head and the fingers 10 are now displaced in opposite directions. Pressing on of the welding head with the fingers 10 and the film welding operation will again take place.

The fingers 10 then move again out of the film structure according to Figure 8 and the cycle of steps begins anew with step 1 (Figure 3).

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

ABSTRACT OF THE DISCLOSURE

A honeycomb structure with a plurality of flexible material strips which are arranged next to one another and are connected to one another is presented. The material strips have a corrugated shape with U-shaped cross section of essentially straight, vertical partial areas (3) and curved, horizontal partial areas (2). The material strips are connected to one another at contact points (4) of the straight, vertical partial areas. In addition, a device for manufacturing a honeycomb has welding sections (6). The flexible material strips (9) are guided by the welding sections (6), where the material strips are welded to one another by means of a comb-like finger system (10). The finger system or the welding sections are laterally displaced by two sections and by a pressing operation taking place between the finger and the welding section. This presses two material strips onto a heated welding wire (7), which leads to the thermal connection of the material strips.

10/031964
531 Rec'd PCT/P 17 JAN 2002

~~Self-supporting Honeycomb Structure from Flexible Film Strips and Process for Manufacturing Same~~

Docket #70372

SELF-CONTAINED HONEYCOMB STRUCTURE FROM FLEXIBLE FILM STRIPS AND METHOD FOR ITS PRODUCTION

FIELD OF THE INVENTION

The present invention pertains to a honeycomb structure from flexible material strips, which are connected to one another, so that a self-supporting honeycomb structure is formed, as well as to a process for manufacturing same.

BACKGROUND OF THE INVENTION

Corresponding honeycomb structures are used, among other things, as transparent or

opaque heat insulation, as filler material for partitions or as the core material in the manufacture of sandwich boards.

If the honeycombs are used as heat insulation, low density is important in order to obtain good insulation values. If the honeycombs shall be used for sandwich boards, high compressive strength combined with high shear strength ~~shear strength~~ is necessary.

Similar honeycomb structures are described in the Auslegeschrift DT 2231959 B2 and in the Offenlegungsschrift DE 197 03 961 A1.

The Auslegeschrift DT 2231959 B2 describes a honeycomb from corrugated, rigid strips, which have an inherent stability, so that they can be stacked up on one another, and form a self-supporting structure, without the strips being welded or bonded to one another. The prerequisite for this is that the arches of the corrugations have such an arrangement that the shortest free distance between two adjacent peaks of the corrugation in each strip is smaller than the greatest free width of the valley of the corrugation (therefore, the corrugated strips cannot be pushed into one another).

Honeycombs of this type cannot be manufactured from flexible material strips, because a flexible strip cannot be bent into a rigid corrugated shape.

Honeycombs of this type are used as the core for sandwich boards made of metal, e.g., in the manufacture of aircraft.

A honeycomb structure made of flexible film strips is described in the Offenlegungsschrift DE 197 03 961 A1, wherein the film strips are welded onto one another in the corrugated form, so that a self-supporting honeycomb is formed. The principal difference from DT 2231959 B2 is that flexible strips are used here and a honeycomb is generated only when the strips are connected to one another by welding or bonding in the transition area from the horizontal and vertical partial areas of the corrugated strips arranged one on top of another. The residual stress (restoring behavior) of the flexible strips ensures that the honeycomb is more rigid and stable than a honeycomb made of pre-corrugated webs. A honeycomb is formed which is similarly bulged as the honeycomb from DT 2231959 B2 and has a nearly isotropic behavior whether it is loaded mechanically in the vertical or horizontal direction. One drawback is that this honeycomb cannot be compressed without distortions developing in the structure. Another drawback of this honeycomb which is linked with the process is the optically nonuniform edge structure. Since individual film strips are welded to one another, the overhanging film strips overlap at the lateral edges in parallel to the direction of production. To obtain a clean edge closure, an edge strip must be cut off, as a result of which drawbacks arise in terms of costs due to clipping.

SUMMARY AND OBJECTS OF THE INVENTION

The basic object of the present invention is to improve a honeycomb of the type mentioned in the introduction such that a self-supporting honeycomb is formed from flexible strips, which has a clean edge structure and can be compressed in a direction in parallel to the direction of production.

~~This object is accomplished according~~ According to the present invention ~~in a honeycomb according to claim 1 by~~ a self-supporting honeycomb ~~being~~is provided manufactured from flexible strips, which honeycomb consists, however, contrary to DE 197 03 961 A1, of horizontal, bent partial areas arranged at right angles to one another in parallel to the direction of production and straight vertical partial areas.

In addition, the bonded or weld seam of the honeycomb being described here ~~consists of~~is located at straight, vertical partial areas rather than of the horizontal and vertical partial areas of the corrugated strips arranged one on top of another (or in other words, at the edges of the parallelepipedic cavities), as in DE 197 03 961.

These features, which are essential for the present invention, are characteristic of a compressible honeycomb, and the advantage is above all that a compressed honeycomb can be transported at a substantially lower cost. Moreover, there are applications, e.g., as heat insulation, which require a small hole diameter, which can be obtained simply by compressing the honeycomb. Minimization of the hole diameter means a maximization of the heat insulation

factor (k value) for a honeycomb.

The honeycomb displays different behaviors under mechanical loading in the horizontal and vertical directions. Compression in parallel to the direction of production is possible without the structure of the honeycomb being distorted. A clean edge is formed on both sides of the honeycomb along the direction of production, because the respective outer film is welded endlessly to the honeycomb.

~~The~~ According to another aspect of the invention, a device ~~with the process steps,~~ is provided with which a self-supporting honeycomb structure ~~according to the present invention with the features of claim 1~~ can be manufactured~~, is disclosed in claim 5~~.

The device has a welding head, which comprises a plurality of welding sections or webs arranged in parallel to and at uniformly spaced locations from one another, all of which are equipped with a welding wire on the front side. Flat slide elements, which can be displaced forward and backward in parallel to the webs, are in contact with the lateral surfaces of the welding webs._There is a small gap between the slide elements, through which the film strips can be guided. In addition, the device has a comb with individual fingers, which can be moved into and withdrawn from the honeycomb structure in front of the welding webs. The welding head and the finger comb are displaceable in parallel to one another.

In addition, the welding head and the finger comb can be pressed against one another.

The necessary U-shaped corrugated structure of the film strips is produced with the device by the lateral displacement of the welding head and the comb, and the film strips are subsequently welded to one another at the vertical partial areas.

Not only plastic films, but all types of flexible material strips can be connected to one another with the device, the only requirement being the weldability of the material.

The honeycomb structure according to the present invention as well as the process steps for manufacturing this honeycomb structure will be explained in greater detail below on the basis of the drawings attached. The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention is illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings;

Figure 1 ~~shows~~is a top view of a honeycomb structure according to the present

invention.

Figure 2 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing an individual process step;

Figure 3 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step;

Figure 4 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step;

Figure 5 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step;

Figure 6 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step;

Figure 7 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing another process step; and

Figure 8 is top view of the device for manufacturing the honeycomb structure according to Figure 1 showing still another process step.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 shows honeycomb structure according to the present invention. The connection of the individual film webs, to the points designated by ~~(4)~~, is possible by bonding

or, as was described above, by preparing a weld seam extending at right angles to the film web.

Figures ~~2-8~~2 to 8 show ~~a top view of~~ the device for manufacturing the honeycomb structure according to Figure 1 ~~with the individual process steps.~~

~~The device with the individual process steps, by means of which the honeycomb structure.~~ An example according to the present invention ~~can be manufactured from film webs by~~will be described below. The example includes individual process step for manufacturing a honeycomb structure with film webs using welded connections~~, will be described below as an example~~.

Figure 2 shows the welding head with the welding webs ~~(~~6~~)~~, which are equipped with welding wires ~~(~~7~~)~~ on the front side, and with the flat feed elements ~~(~~8~~)~~, which are in contact with the welding webs.

The welding head is located in the starting position, and the individual film strips ~~(~~9~~)~~ are inserted between the narrow gaps of the feed elements.

Figure 3 shows the first ~~process~~processing step. The feed elements ~~(~~8~~)~~ move forward until they project from the welding head over a certain distance. The finger comb ~~(~~10~~)~~ now moves between the feed elements and thus into the film strip until it stands in front of the welding head over the full welding height.

The feed elements {8} move back again behind the welding plane corresponding to Figure 4. The welding head and the finger comb {10} are now displaced in parallel horizontally by an amount corresponding to twice the distance between two welding spots. The first welding of the film takes place in this position, the welding head and the welding fingers being pressed onto one another.

According to Figure 5, the fingers {10} again move out of the film strip {9}. The feed elements {8} then move forward and the film structure welded together is fed. The welding head again moves back into the starting position by an amount corresponding to twice the space between two welding spots.

The fingers {10} then move again into the film structure corresponding to Figure 6.

Figure 7 shows how the slides {8} move back behind the welding plane.

The welding head and the fingers {10} are now displaced in opposite directions. Pressing on of the welding head with the fingers {10} and the film welding operation will again take place.

The fingers {10} then move again out of the film structure according to Figure 8 and the

cycle of steps begins anew with step 1 (Figure 3).

~~Abstract~~

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

ABSTRACT OF THE DISCLOSURE

A honeycomb structure with a plurality of flexible material strips which are arranged next to one another and are connected to one another is presented~~, in which t~~. The material strips have~~ according to the present invention~~ a corrugated shape with U-shaped cross section of essentially straight, vertical partial areas (3) and curved, horizontal partial areas (2)~~, wherein t~~. The material strips are connected to one another at contact points (4) of the straight, vertical partial areas.

In addition, a device for manufacturing a honeycomb ~~according to the present invention is disclosed, which~~ has welding sections (6)~~, by which t~~. The flexible material strips (9) are guided by the welding sections (6), where the~~ said~~ material strips are welded to one another by means of a comb-like finger system (10)~~ by t~~. The finger system or the welding sections ~~be~~ingare laterally displaced by two sections and by a pressing operation taking place between the finger and the welding section~~, which~~. This presses two material strips onto a heated welding wire (7), which leads to the thermal connection of the material strips.

~~Figure 1~~

~~Figure 1 through Figure 8~~

~~Figure 1~~

~~KEY:~~

~~Produktionsrichtung - Direction of production~~

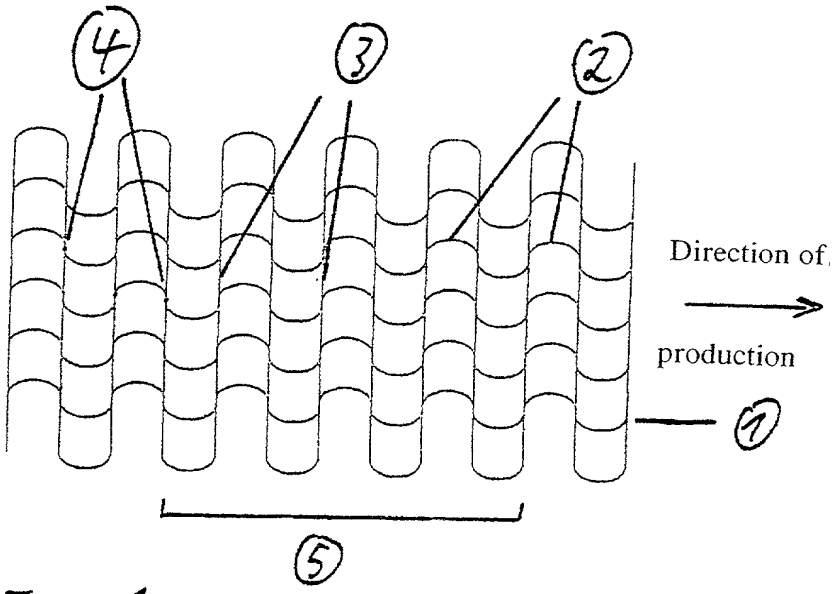

Fig 1

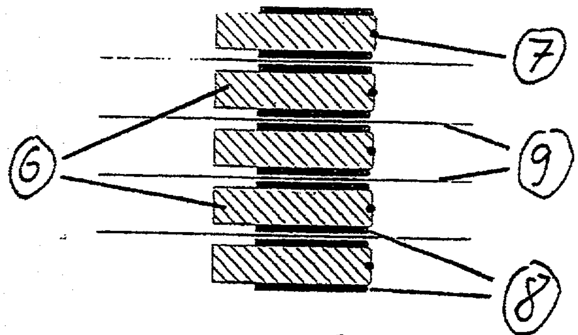

Fig 2

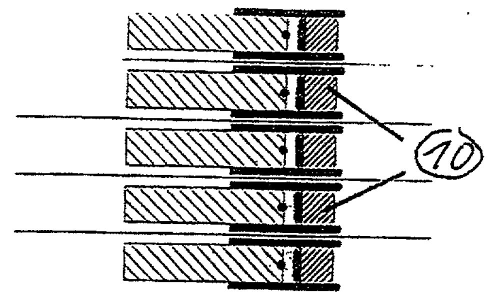

Fig 3

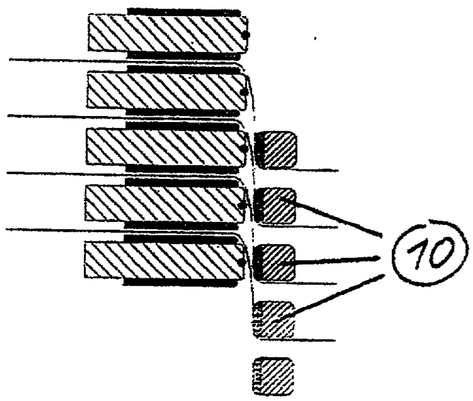

Fig 4

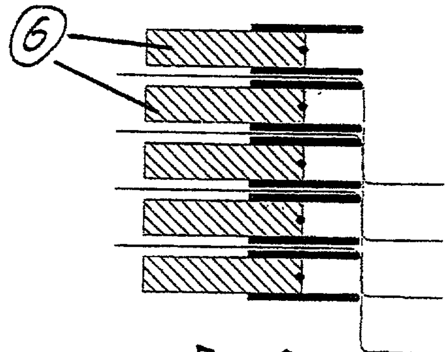

Fig 5

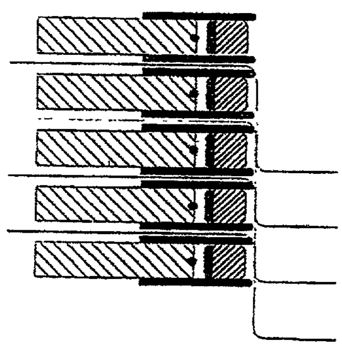

Fig 6

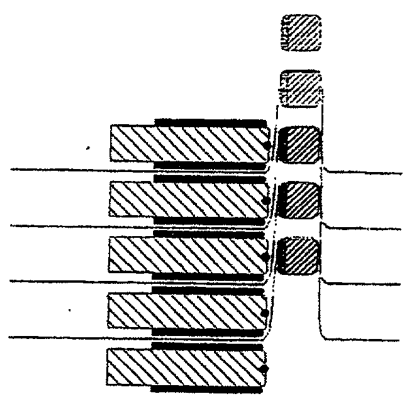

Fig 7

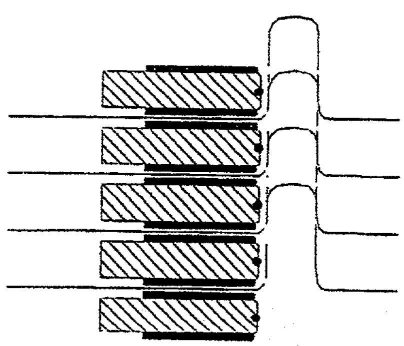

Fig 8

1-00

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20.12.2001

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→Inventor's signature _____ →Date _____
Residence _____ Citizenship _____
Post Office Address _____

Full name of third inventor _____

→Inventor's signature _____ →Date _____
Residence _____ Citizenship _____
Post Office Address _____

Full name of fourth inventor _____

→Inventor's signature _____ →Date _____
Residence _____ Citizenship _____
Post Office Address _____

Full name of fifth inventor

→Inventor's signature _____ →Date _____
Residence _____ Citizenship _____
Post Office Address _____

Full name of sixth inventor _____

→Inventor's signature _____ →Date _____
Residence _____ Citizenship _____
Post Office Address _____

70372.3

(Number)	(Country)	(Day/Month/Year filed)
(Number)	(Country)	(Day/Month/Year filed)

I hereby claim the benefit under Title 35, United States Code, 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code 112. I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No)	(Filing Date)	(Patented, Pending, Abandoned)
(Application Serial No)	(Filing Date)	(Patented, Pending, Abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: **John J. McGlew, Reg. 17,722; and/or John James McGlew, Reg. 31,903; and/or Hilda S. McGlew Reg. 30,295; and/or Theobald Dengler, Reg. 34,575; and/or Keith D. Moore, Reg. 44,951**

Address all calls to: John James McGlew at telephone no. (914) 941-5600
Address all correspondence to:

McGLEW AND TUTTLE, P.C.
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SCARBOROUGH, NEW YORK 10510-0827

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

DECLARATION FOR PATENT APPLICATION

Docket No.70372

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: *SELF-CONTAINED HONEYCOMB STRUCTURE FROM FLEXIBLE FILM STRIPS AND METHOD FOR ITS PRODUCTION*

the specification of which

(Check one) [ ] is attached hereto.
[X] was filed as PCT international application
Number PCT/DE00/01949
on 20/June/2000
and was amended under PCT Article 19
on _____

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 (a)-(d) or 365 (b) of any foreign application(s) for patent or inventor's certificate or 365 (a) of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date or any PCT international application(s) designating at least one country other than the United States of America by me on the same subject matter having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed
199 28 712.0	Germany	23/June/1999	Yes
(Number)	(Country)	(Day/Month/Year filed)	